

Patent claims

1. Field-effect power transistor having:
 - a first semiconductor region (10) with first MOS channels (20) having a first ratio of a channel width (w) to a channel length (l) for conducting through an electric current from a source terminal (17) to a drain terminal (11) in a manner dependent on a signal at a gate contact (10') of the first semiconductor region (10);
 - 5 at least one second semiconductor region (12) with second MOS channels (22) having a second ratio of the channel width (w) to the channel length (l) for conducting through an electric current from the source terminal (17) to the drain terminal (11) in a manner dependent on a signal at the gate contact (12') of the second semiconductor region (12); and
 - 10 a drive terminal (16) for providing a drive signal at the gate contacts (10'; 12'),
 - 15 a first predetermined resistor (14) in each case being provided between the gate contact (12') of the at least second semiconductor region (12) and the drive terminal (16); and
 - 20 an overvoltage protection device (13) being provided at least between the gate contact (12') of the second semiconductor region (12) and the drain terminal (11), said device switching on the at least second semiconductor region (12) if the voltage between the gate contact (12') of the second semiconductor region (12) and the drain terminal (11) exceeds a predetermined value.
 2. Power semiconductor according to claim 1,
 - 35 characterized in that the second ratio of the channel width (w) to the channel length (l) is less than or

approximately equal to the first ratio of the channel width (w) to the channel length (l).

3. Power semiconductor according to claim 2,
5 characterized
in that the second ratio of the channel width (w)
to the channel length (l) is at least a factor of
2 less than the first ratio of the channel width
(w) to the channel length (l).
10
4. Power semiconductor according to one of the
preceding claims,
characterized
in that the first semiconductor region (10) and
15 the second semiconductor region (12) intermesh,
preferably in finger-like fashion.
5. Power semiconductor according to one of the
preceding claims,
20 characterized
in that the first semiconductor region (10) is
formed by the first channels (20), which are
connected to the gate terminal (16) of the field-
effect power transistor, and the second
25 semiconductor region (12) is formed by the second
channels (22), which lie between the first
channels (20) and are connected to the overvoltage
protection device (13).
30
6. Power semiconductor according to one of the
preceding claims,
characterized
in that the overvoltage protection device (13) is
provided in the form of a zener diode.
35
7. Power semiconductor according to one of the
preceding claims,
characterized

in that the second channels (22) are provided in strip-like fashion laterally separated by first channels (20), preferably equidistantly.

- 5 8. Power semiconductor according to one of the preceding claims,
characterized

10 in that the first and second channels (20; 22) are patterned in the same way and/or embodied as trenches.

9. Power semiconductor according to claim 8,
characterized

15 in that the trenches (20; 22) are embodied with uniform oxide thickness.

10. Power semiconductor according to claim 8,
characterized

20 in that the trenches (20; 22) are embodied as field plate trenches.

11. Power semiconductor according to one of the preceding claims,
characterized

25 in that the first predetermined resistor (14) is embodied between the two gate contacts (10'; 12') as a polysilicon resistor.
)

12. Power semiconductor according to one of the preceding claims,

30 characterized
in that the first predetermined resistor (14) is embodied between the two gate contacts (10'; 12') as a trench poly-resistor, adjustable by way of the trench length, trench width and number of trenches.

13. Power semiconductor according to one of the preceding claims,
characterized
in that the first predetermined resistor (14) is
5 embodied as a semiconductor region with a predetermined dopant concentration.
14. Power semiconductor according to one of the preceding claims,
10 characterized
in that the value of the first predetermined resistor (14) is dimensioned in a manner dependent on a gate resistor (15).
15. 15. Power semiconductor according to claim 14,
characterized
in that the value of the first predetermined resistor (14) lies in the range between 0.2 and 2 times the value of the gate resistor (15),
20 preferably between half the value of said gate resistor and the value of said gate resistor.
16. Power semiconductor according to one of the preceding claims,
25 characterized
in that a second predetermined resistor (18) is provided between the drive terminal (16) and the gate contact (10') of the first semiconductor region (10).
30
17. Power semiconductor according to claim 16,
characterized
in that the second predetermined resistor (18) is dimensioned in a manner dependent on the first predetermined resistor (14) and the gate capacitances of the respectively adjoining gate contacts (10'; 12').
35

18. Power semiconductor according to claim 16,
characterized

in that the second predetermined resistor (18) is
dimensioned in such a way that the product of the
5 first predetermined resistor (14) and the gate
capacitance of the second semiconductor region
(12) is approximately equal to the product of the
second predetermined resistor (18) and the gate
capacitance of the first semiconductor region
10 (10).